6612-18
Serial No.: 10/669,436
Filed: September 25, 2003

AMENDMENTS TO CLAIMS

1. (currently amended) A process for measuring stress on a surface having an insulating coating ~~by~~ comprising measuring resistivity of said coating, and determining therefrom the stress on the surface, wherein ~~comprising using as~~ said coating comprises a silica-stabilized dielectric film.

2-4 (canceled)

5. (new) A stress sensor comprising:

a first electrode;
at least one other electrode; and
a dielectric layer disposed in relation to the first and the at least one other electrode for the electrodes to supply an electric field (E) to the dielectric layer, wherein the dielectric layer comprises a diamond-like carbon film that exhibits a change in conductivity when exposed to an electric field (E) at a level above a critical electric field (E*) and wherein the critical electric field (E*) of the diamond-like film shifts under an applied stress.

6. (new) The stress sensor of claim 5, wherein the change in conductivity occurs in real-time.

7. (new) The stress sensor of claim 5, wherein the critical electric field (E*) comprises about $2x10^5$ V/cm.

8. (new) The stress sensor of claim 5, wherein the diamond-like carbon film is a stabilized diamond-like carbon film.

9. (new) The stress sensor of claim 8, wherein the diamond-like carbon film is stabilized with silica.

10. (new) The stress sensor of claim 5, wherein the resistivity of the diamond-like carbon film changes from a first value of about 10^{11} to 10^{13} ohm.cm to a second value of about 10^{8} to 10^{9} ohm.cm.

11. (new) The stress sensor of claim 5, wherein compressive forces on the diamond-like carbon film lowers the value of the critical electric field (E*) and wherein tensile forces on the diamond-like carbon film increases the value of the critical electric field (E*).

12. (new) The stress sensor of claim 5, wherein the conductivity of the film reversibly changes when exposed to the electric field.

13. (new) The stress sensor of claim 5, wherein the diamond-like carbon layer is disposed between the first electrode and the at least one other electrode.

14. (new) The stress sensor of claim 13, wherein the diamond-like carbon layer is deposited onto a surface of a conductive structure being measured for stress and wherein the first electrode comprises the conductive structure.

15. (new) The stress sensor of claim 13, wherein a conductive diamond-like carbon film is deposited onto a surface of a non-conductive structure being measured for stress and wherein the diamond-like carbon film is deposited onto the conductive diamond-like carbon film and the first electrode comprises the conductive diamond-like carbon film deposited on the structure.

16. (new) The stress sensor of claim 5, comprising a plurality of other electrodes disposed onto the dielectric layer to form an array of sensors.

17. (new) The stress sensor of claim 5, wherein the first electrode and the at least one other electrode are disposed laterally with respect to each other.

18. (new) The stress sensor of claim 17, wherein the diamond-like film has a thickness and the electrodes are disposed laterally with respect to each other a distance no greater than the thickness of the diamond-like carbon film.

19. (new) The stress sensor of claim 5, wherein at least one of the first electrode and the at least one other electrode comprises a conductive diamond-like carbon film.

20. (new) The stress sensor of claim 19, wherein the conductive diamond-like carbon film comprises at least one metal introduced into a matrix of a diamond-like carbon material.

21. (new) The stress sensor of claim 5, comprising a plurality of the other electrodes, wherein the diamond-like carbon film is deposited onto a surface of a structure being measured for stress as a continuous layer to serve as a sensing layer for the plurality of the other electrodes.

22. (new) A stress sensor comprising:

a first electrode;

at least one other electrode; and

a sensing layer disposed in relation to the first and the at least one other electrode for the electrodes to supply an electric field (E) to the sensing layer, wherein the sensing layer comprises a material that exhibits a change in conductivity when exposed to an electric field (E) at a level above a critical electric field (E*) and wherein the critical electric field (E*) of the material shifts under an applied stress.

23. (new) A stress sensor comprising:

a first electrode;

at least one other electrode; and

a dielectric layer disposed in relation to the first and the at least one other electrode for the electrodes to supply an electric field (E) to the dielectric layer, wherein the dielectric layer comprises a stabilized diamond-like carbon film that exhibits a real-time reversible change in conductivity when exposed to an electric field (E) at a level above a critical electric field (E*) and wherein the critical electric field (E*) of the diamond-like film shifts under an applied stress.

24. (new) A method for determining whether a particular level of stress has been applied to a structure using the stress sensor of claim 5, the method comprising:

applying an electric field (E) with the first electrode and the at least one other electrode to the dielectric layer;

monitoring the conductivity of the dielectric layer; and

determining whether the particular level of stress has been applied to the structure based on a change in the conductivity of the dielectric layer.

25. (new) The method of claim 24, comprising determining whether the particular level of stress has been applied based on a shift in the critical electric field (E*) of the dielectric layer resulting from the applied stress.

26. (new) The method of claim 25, comprising applying an electric field (E) at a level less than the critical electric field (E*) and determining whether a particular compressive stress has been applied to the structure based on a change in the conductivity of the dielectric layer which results from a shift in the critical electric field (E*) of the dielectric layer as a result of the compressive stress.

27. (new) The method of claim 26, comprising determining whether a particular compressive stress has been applied to the structure based on a change in conductivity of the dielectric layer which results from a shift in the critical electric field (E*) of the dielectric layer to that less than the electric field (E) applied.

28. (new) The method of claim 25, comprising applying an electric field (E) at a level greater than the critical electric field (E*) and determining whether a particular tensile stress has been applied to the structure based on a change in the conductivity of the dielectric layer which results from a shift in the critical electric field (E*) of the dielectric layer as a result of the tensile stress.

29. (new) The method of claim 28, comprising determining whether a particular tensile stress has been applied to the structure based on a change in conductivity of the dielectric layer which results from a shift in the critical electric field (E*) of the dielectric layer to that greater than the electric field (E) applied.